GIS SPUTNIK

version 1.0

User manual

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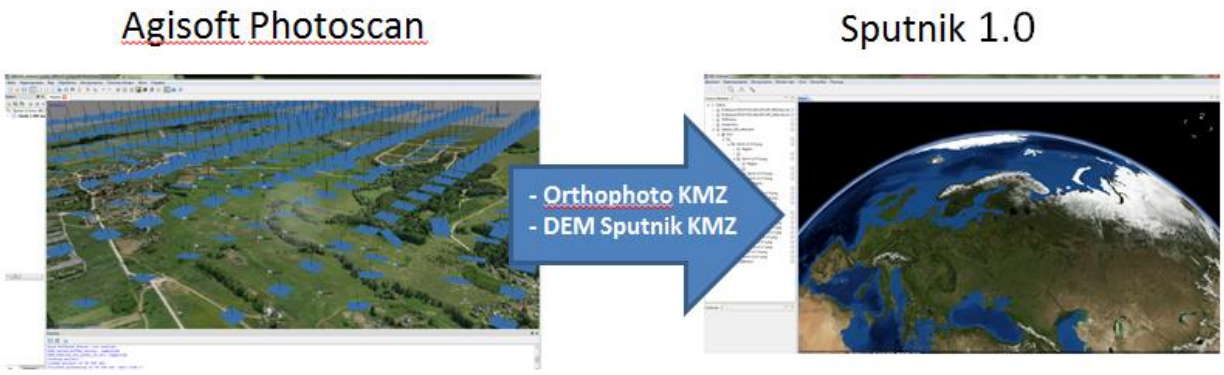
OVERVIEW

Sputnik is a modern geographic information system (GIS). It aimed to provide situational awareness at different application areas and supports number of Open Geospatial Consortium (OGS) standards.

Sputnik is fully compatible with photogrammetric software Agisoft PhotoScan Pro. Uploading orthophoto and DEM generated with PhotoScan is a smooth and easy procedure. Moreover, Sputnik supports PhotoScan LOD-enabled export formats both for photo and elevation model.



With Sputnik you may import orthophoto and DEM without any limitations on file size, coverage area etc. Basic low scale LandSat and SRTM coverage provide a single working space for all users' datasets. Support of OGC standards such as WMS, WFS, KML allows to link Sputnik up with the external GIS-servers.

The main format most often used in Sputnik is KML. It makes possible to upload in Sputnik virtually any data including 3D models, spherical panoramas, various real time sensors data etc.

This manual contains instructions on software installation and starting up, description of application interface and basic tutorials on common workflows.

If you have any comments, reports and recommendations on GIS Sputnik please e-mail us at **sputnik@geoscan.aero**.

INSTALLATION AND STARTUP

System requirements:

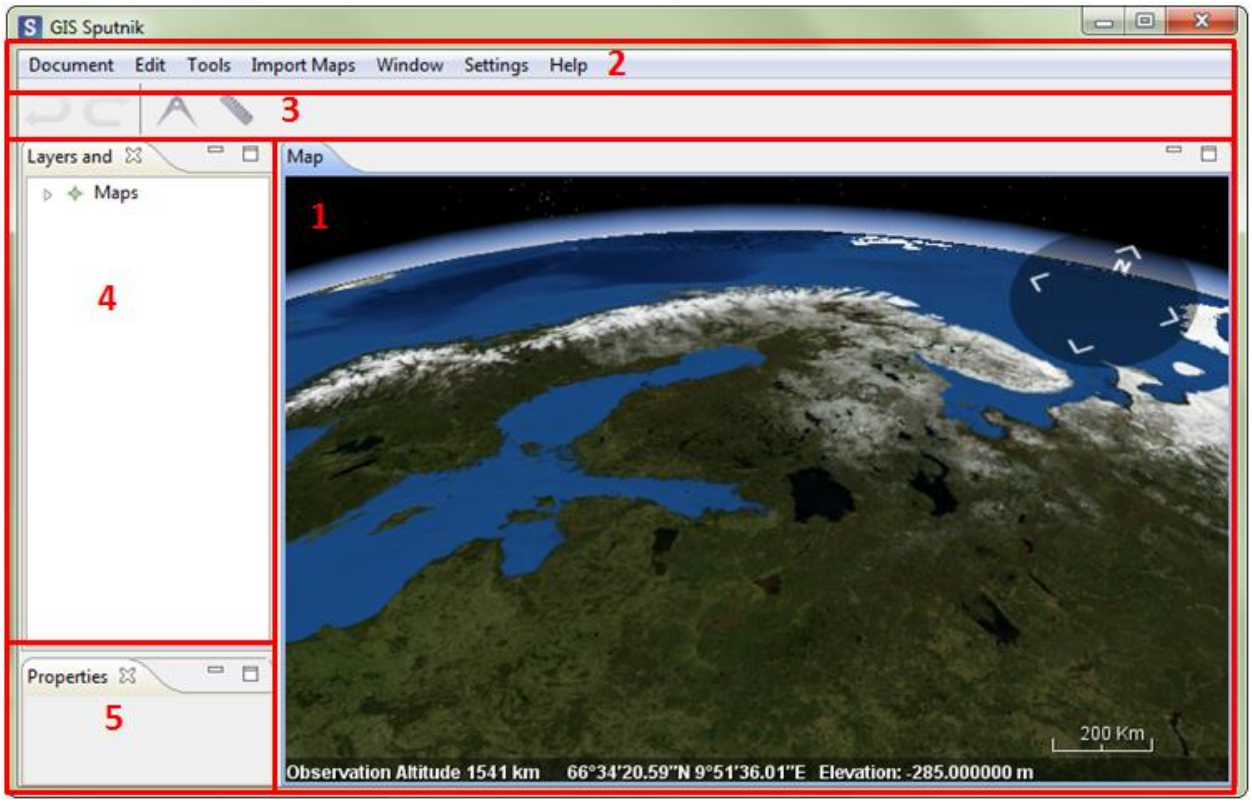
- Windows XP, 7, 8 (32/64-bit)
- 1 Gb HDD free space (used for application files and cached data)
- 2 Gb RAM
- Video: Nvidia, ATI/AMD, Intel HD 4000, 1Gb VRAM

Installation procedure:

- Download installation package from http://www.geoscan.aero/en/gis-sputnik webpage.
- Run installation file Sputnik_1.0…x64.exe (for 64-bit Windows) or Sputnik_1.0…x86.exe (for 32-bit) with administrator privileges.
- Follow onscreen instructions to complete installation.
- After installation is finished, KML and KMZ files will be associated with Sputnik.
- To start application choose it in Windows Start menu: **Start** → Sputnik

GETTING STARTED

When you launch application the main program window appears:



The main parts of application window are Map area (1), User menu (2), Toolbar (3), Layers (4) and Properties (5) panels.

Default basic coverage used in Sputnik is Landsat imagery combined with SRTM elevation model.

When Map view is active you may use keyboard and mouse buttons for navigation on a map:

Navigation options	User action
Scaling (zoom in/zoom out)	Mouse: rotate mouse wheel Keyboard: use “+” and “-” buttons on a keyboard
Moving on a map	Mouse: press left button while on the map and drag to move the map Keyboard: (press left mouse button) and move the map using keyboard cursor keys
Free change of view direction	Mouse: while pressing right mouse button: - move mouse forward and backward — this will change vertical angle of view; - move mouse right and left —this will rotate “virtual camera” around pointed location Keyboard: - <Shift> + Up/Down cursor keys — to change vertical angle of view - <Shift> + Right/Left cursor keys — to rotate camera view
Reset angle to view "top-down" and rotate map to "north-up" view	Press «R» on keyboard
Reset view to "North up"	Press «N» on keyboard

All the user custom maps, elevation and 3D models opened in Sputnik are shown in Layers list. To enable or disable a layer check/uncheck the box near its title.

To rearrange layers order simply drag and drop layer with left mouse button.

TUTORIALS

This section contains short descriptions of loading different types of geospatial data, establishing connection with WMS servers and so on.

Loading orthophoto and DEM generated with Agisoft PhotoScan

Overview

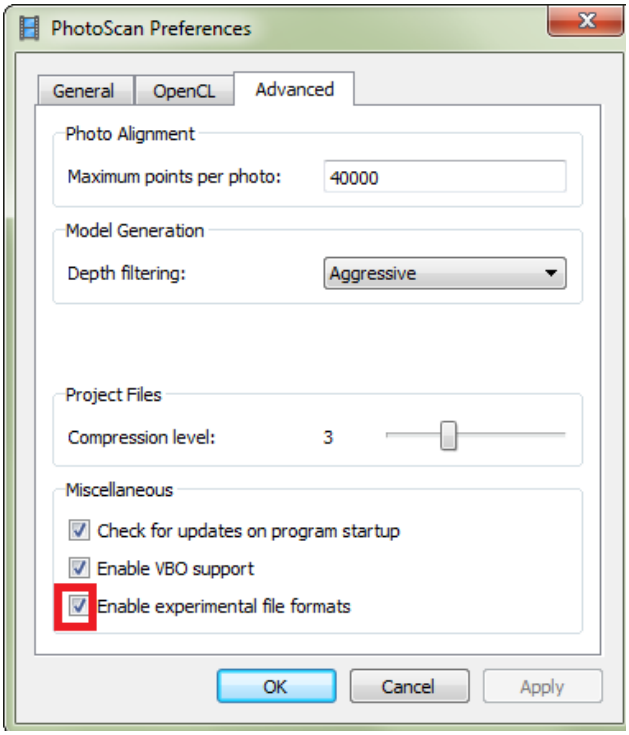
Photoscan Pro software (www.agisoft.ru) produces highly accurate 3D models, true orthophoto maps, and digital surface models based on aerial survey data. In PhotoScan it is possible to export all these data types with so called image or model pyramids, i.e. range of lower scale datasets having different level of detail (LOD). Sputnik fully supports this option and allows to load images, elevation and 3D models of unlimited size.

Exporting data in PhotoScan Pro

Before uploading orthophoto and DEM to Sputnik it is necessary first to export them from PhotoScan. Currently only KMZ file format allows to enable full support of LOD pyramids.

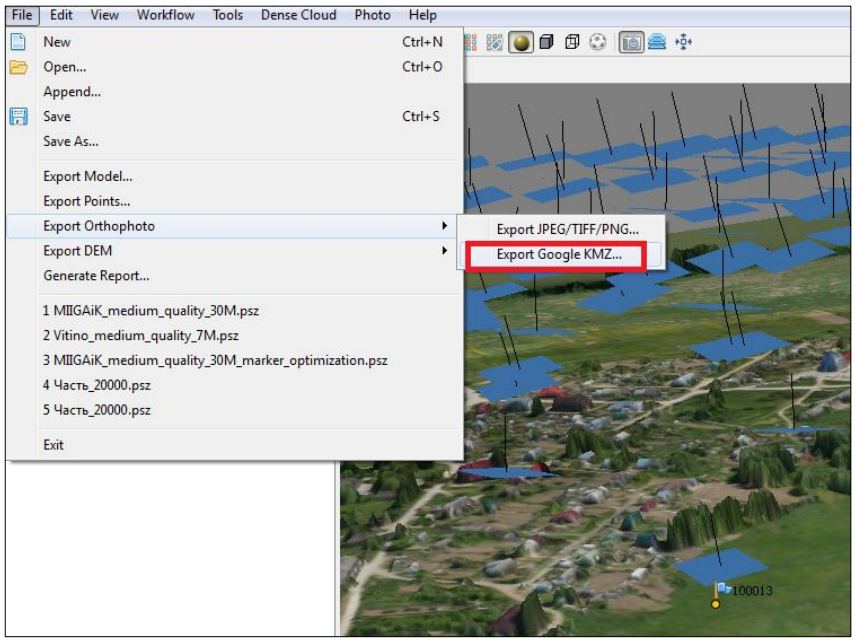
First:

- Make sure you have installed PhotoScan Pro version 0.9.1.1703 or later. If you have an older version, upgrade it. Upgrade package is available at http://www.agisoft.ru/products/photoscan/professional/demo/PhotoScan.
- To enable LOD support, turn on an option “Enable experimental file formats” in **Tools** > **Preferences** menu.

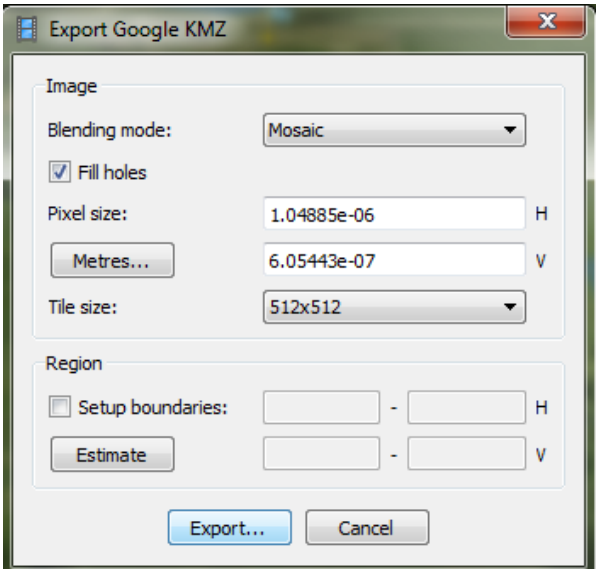


To export orthophoto:

- When model is built, export orthophoto in a normal way, but choose KMZ as an output file format (**File** > **Export Orthophoto** > **Export Google KMZ**):



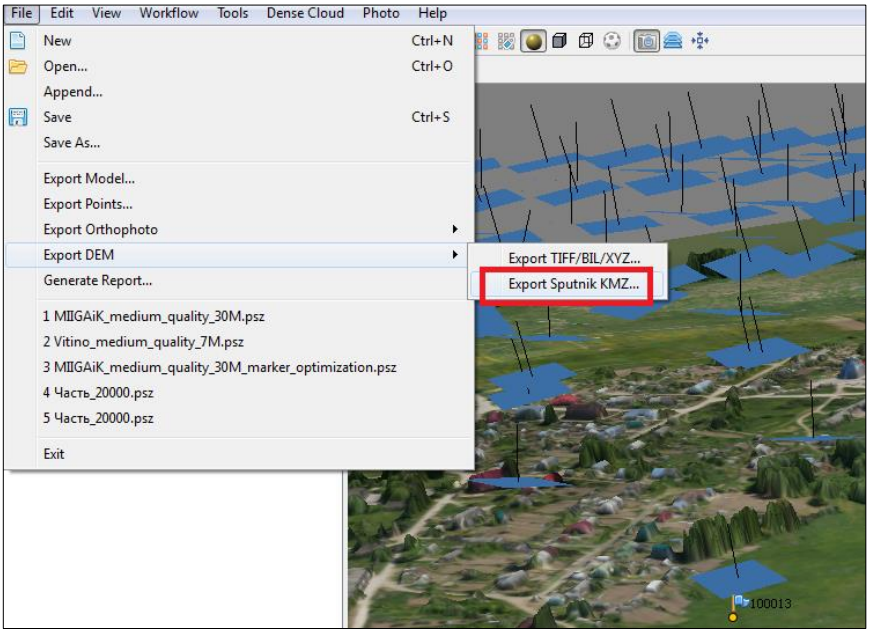
- Set export parameters and press **Export** button:



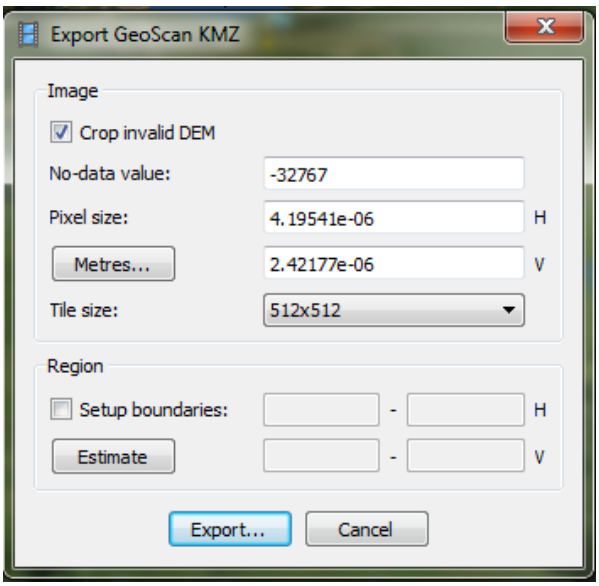
An orthophoto map generated may be loaded and displayed in any geoviewers supporting KML, e.g. Google Earth.

To export elevation model:

- Select **File** > **Export DEM** > **Export Sputnik KMZ**:



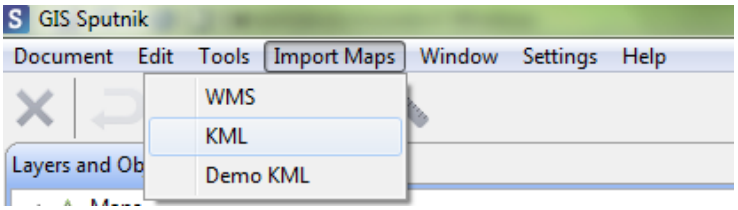
- Set export parameters and press **Export** button:



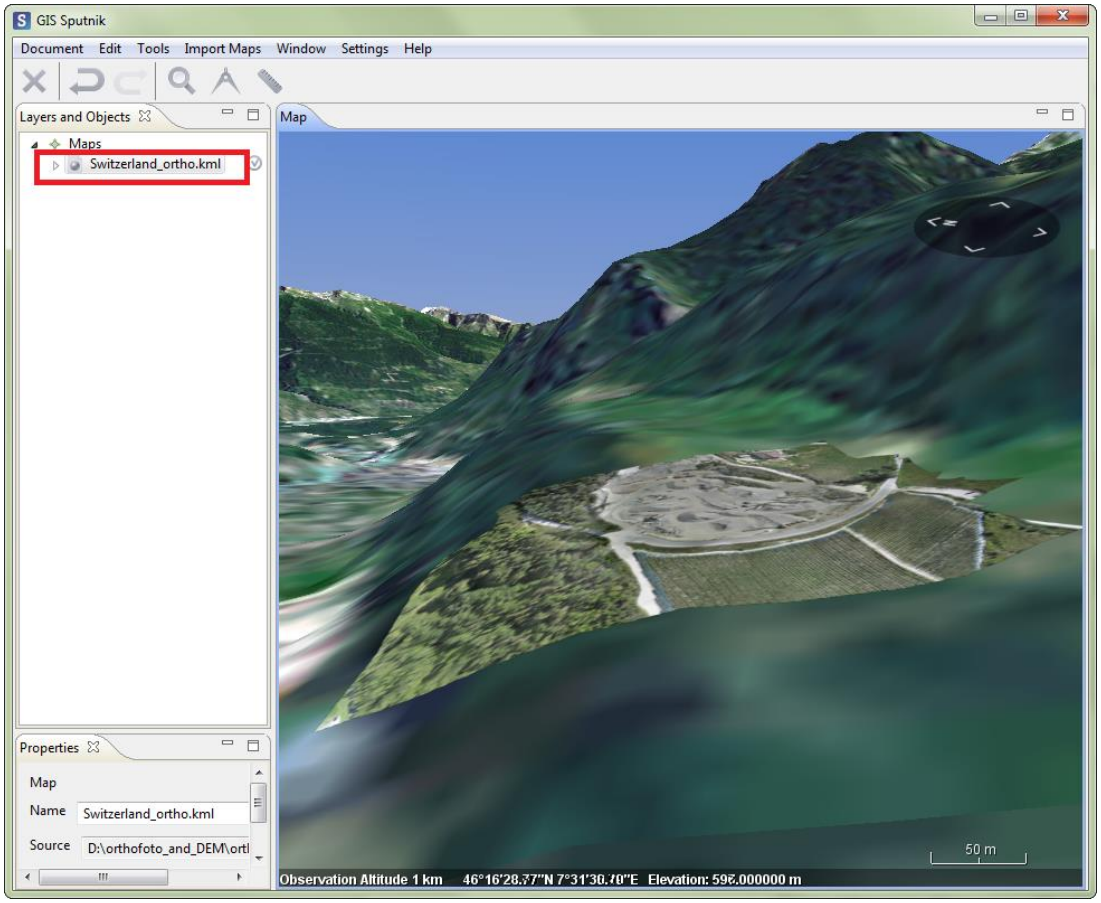
Special extension of KML has been developed by GeoScan team in collaboration with Agisoft to export elevation models in form of pyramid of different LOD mosaic layers.

Loading orthophoto and DEM in Sputnik

- Use your own data or sample data that you may download from ftp://public:public@ftp.plaz.aero/public/Sputnik_demo/orthophoto_and_DEM.zip (118 Mb).
- Unpack archive if you are using sample data.
- To open orthophoto in Sputnik select **Import Maps** > **KML** in user menu and choose orthofoto_and_DEM/quarry_sensefly_orto_27mm_mosaic/Switzerland_ortho.kml:

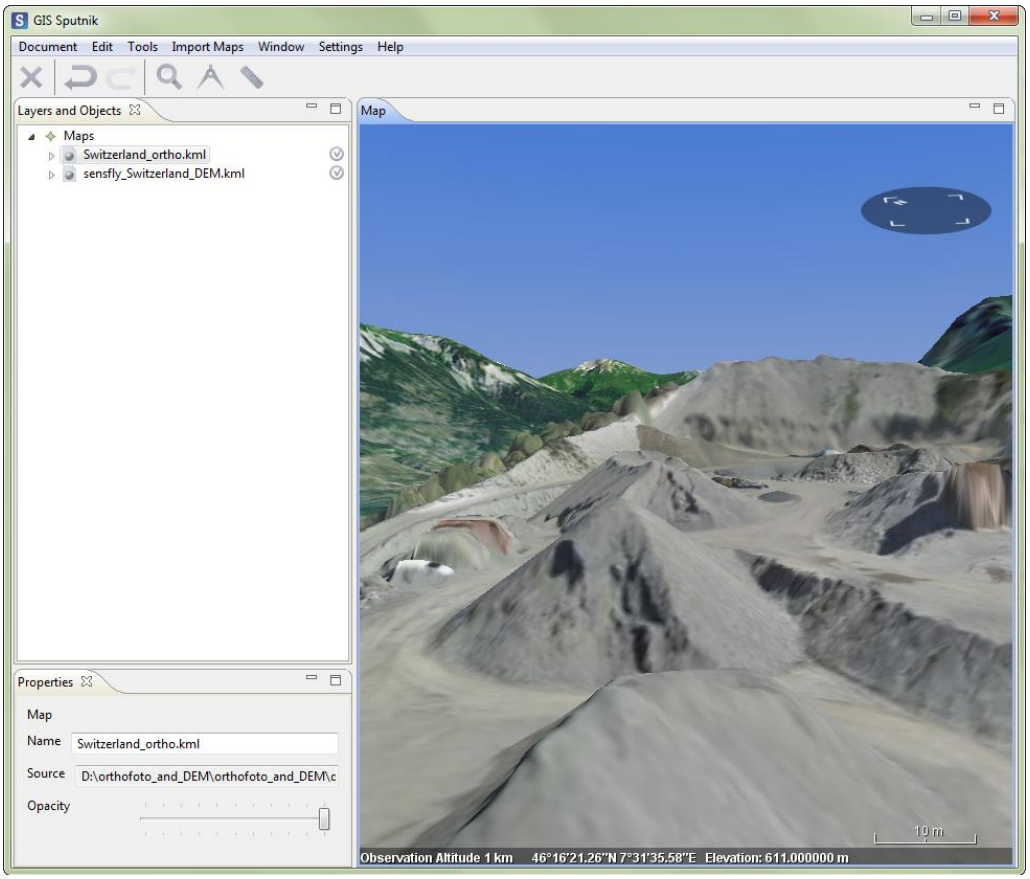


- When orthophoto is loaded new layer appears in "Layers" pane.
- To move map to the location of orthophoto, open Layers tree and double click on Switzerland_ortho.kml.
- Use checkboxes to hide and show layers.
- Zoom map in to view it in details:



Orthophoto loaded will be aligned with default SRTM elevation model. SRTM terrain data have areal resolution 90 m and vertical accuracy about 1 m. To have more detailed surface model load your own DEM. Loading DEM is performed in the same way as loading orthophoto:

Select **Import Maps** > **KML** in user menu and choose:
orthofoto_and_DEM/quarry_sensefly_DEM_90mm/sensfly_Switzerland_DEM.kml:



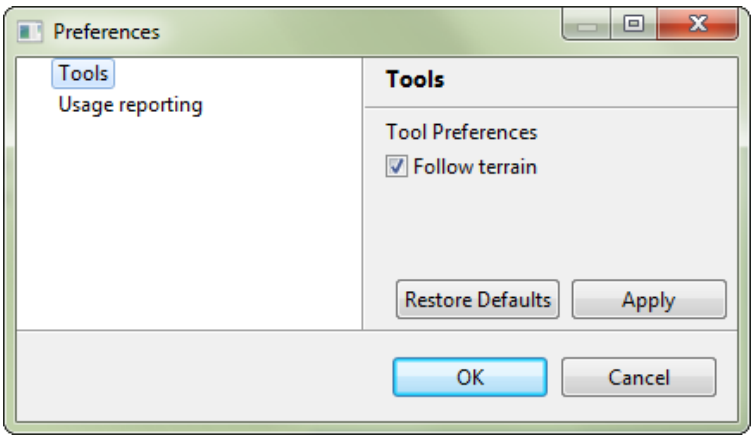
Now both local orthophoto and local DEM are loaded and you may browse them from above and from the ground level, and analyze using built-in tools.

Measurement tools

There are few basic measurement tools in Sputnik that allow to measure heights and distances.

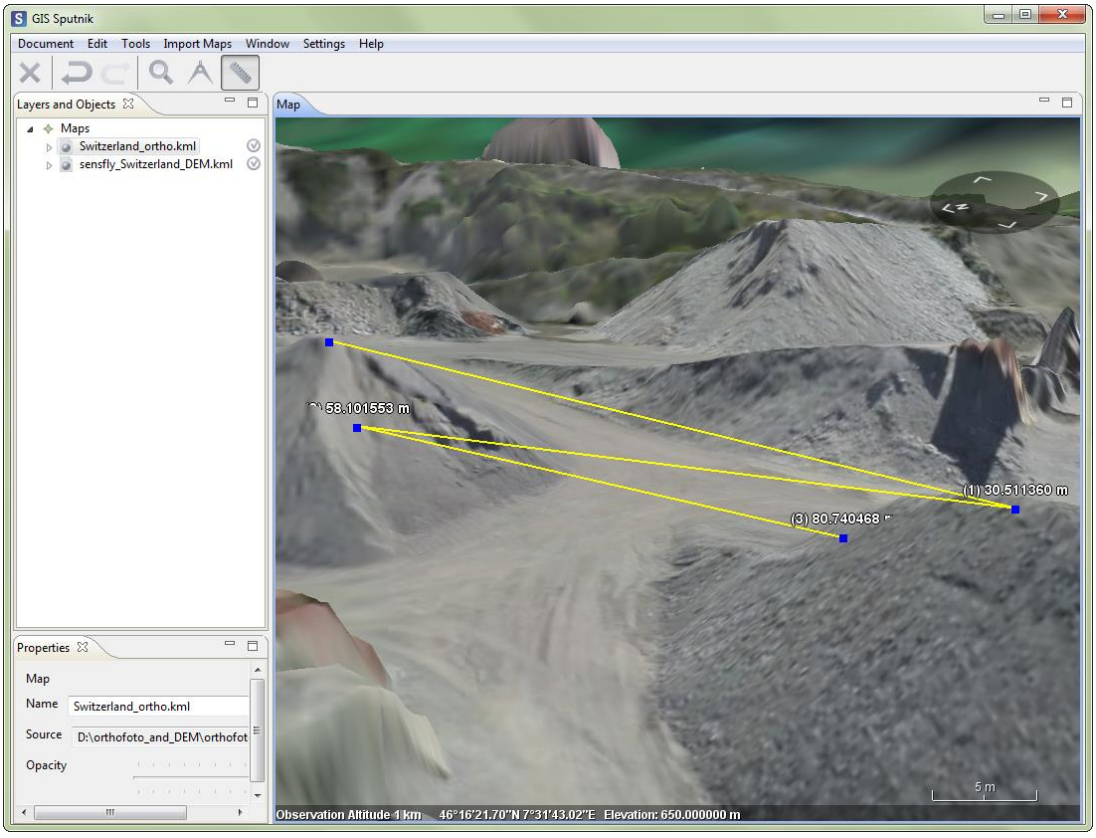
Ruler

Ruler is a tool to measure distances. It may work in two different modes — either calculates straight line distance between two points or measure the shortest path between these points following terrain. The former is default option. To enable the latter you need to check **Follow terrain** option in **Settings** > **Preferences** user menu.

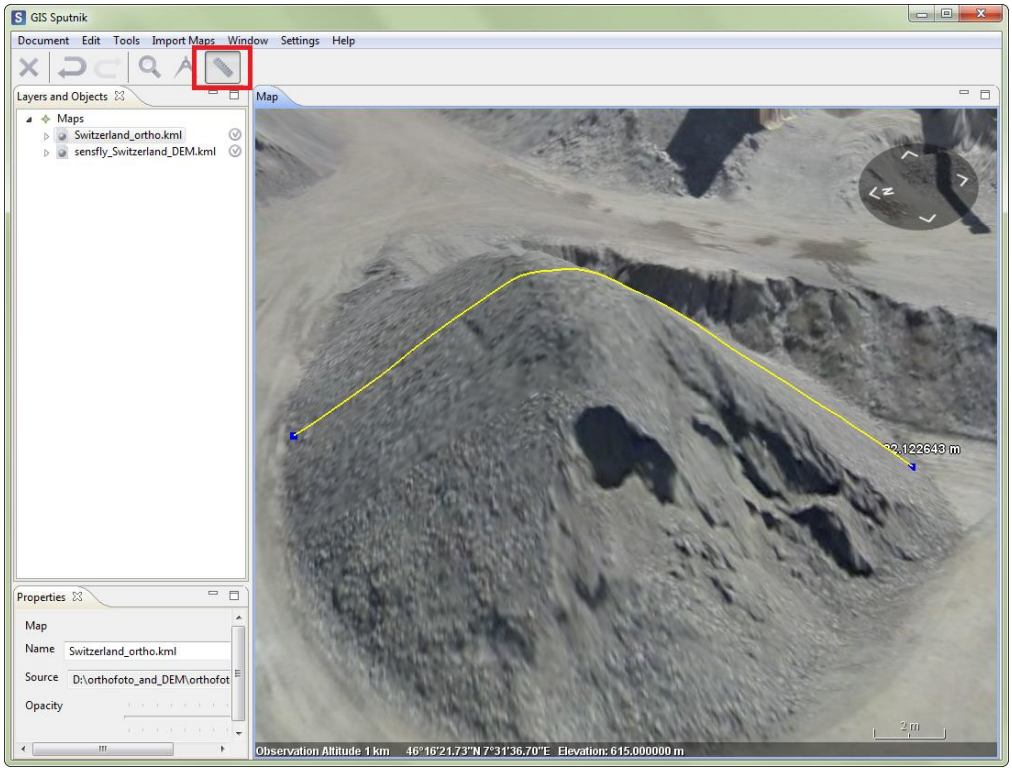


To perform a measurement, select Ruler on tool panel, then click on a map to mark a path. Balloon at each point shows its distance from the starting point.

In straight mode:



And in follow terrain mode:



To move a point, simply drag it with left mouse button.

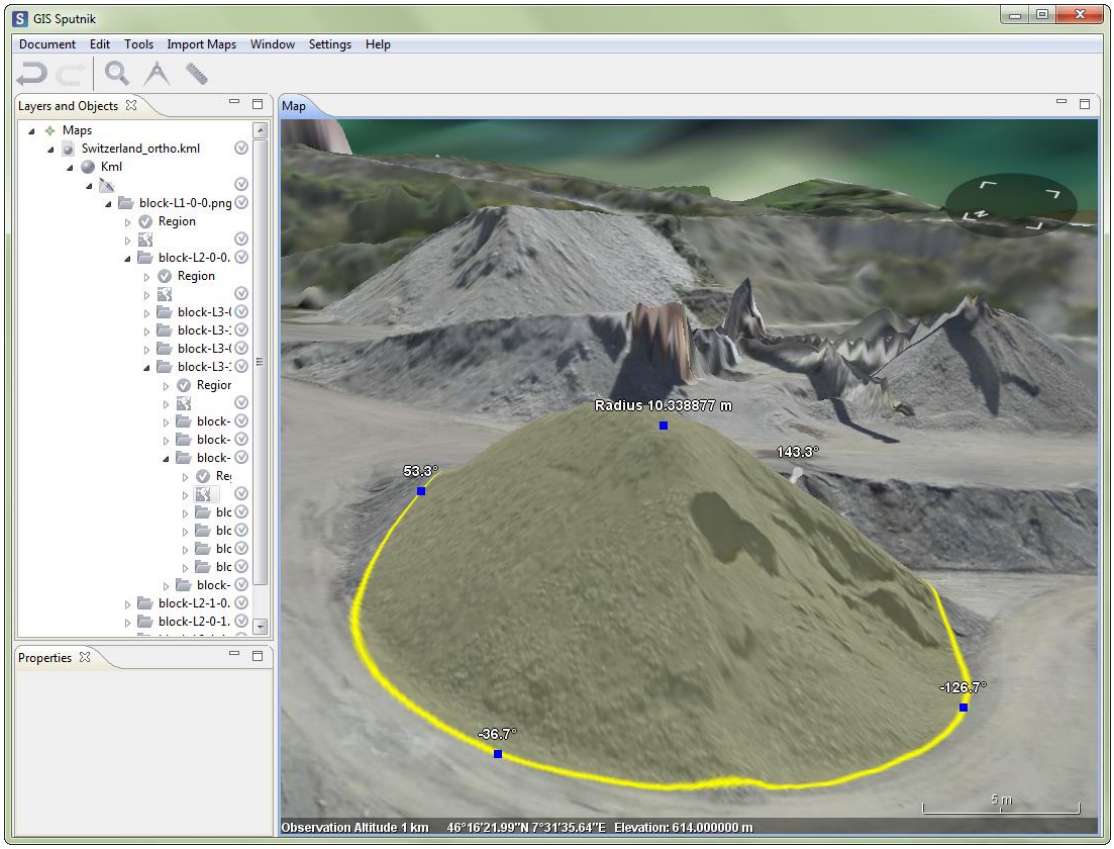
To stop marking a path, place the last point using right mouse button.

Circle

Circle measurement tool allows to display a circle on a map and measure its radius. It might be useful for simple approximation.

To measure radius:

- Select on tool panel.
- Place a point on a map with left mouse button. This point is a circle center.
- Dragging blue square mark change circle radius.
- To move circle drag its central point.



Loading 3D models generated in Agisoft Photoscan

Overview

In addition to producing orthophoto and elevation models PhotoScan may be used to create textured georeferenced 3D models of real objects. You may try to follow this tutorial with your own data or with sample 3D model of ruined milk farm which is heritage object located in north part of St. Petersburg (Russia). The model was generated in PhotoScan Pro based on images taken with a camera installed on quadcopter.

Sample data is available from the following link:
ftp://public:public@ftp.plaz.aero/public/Sputnik_demo/house_3D.zip (13 Mb). Save file and unpack it.

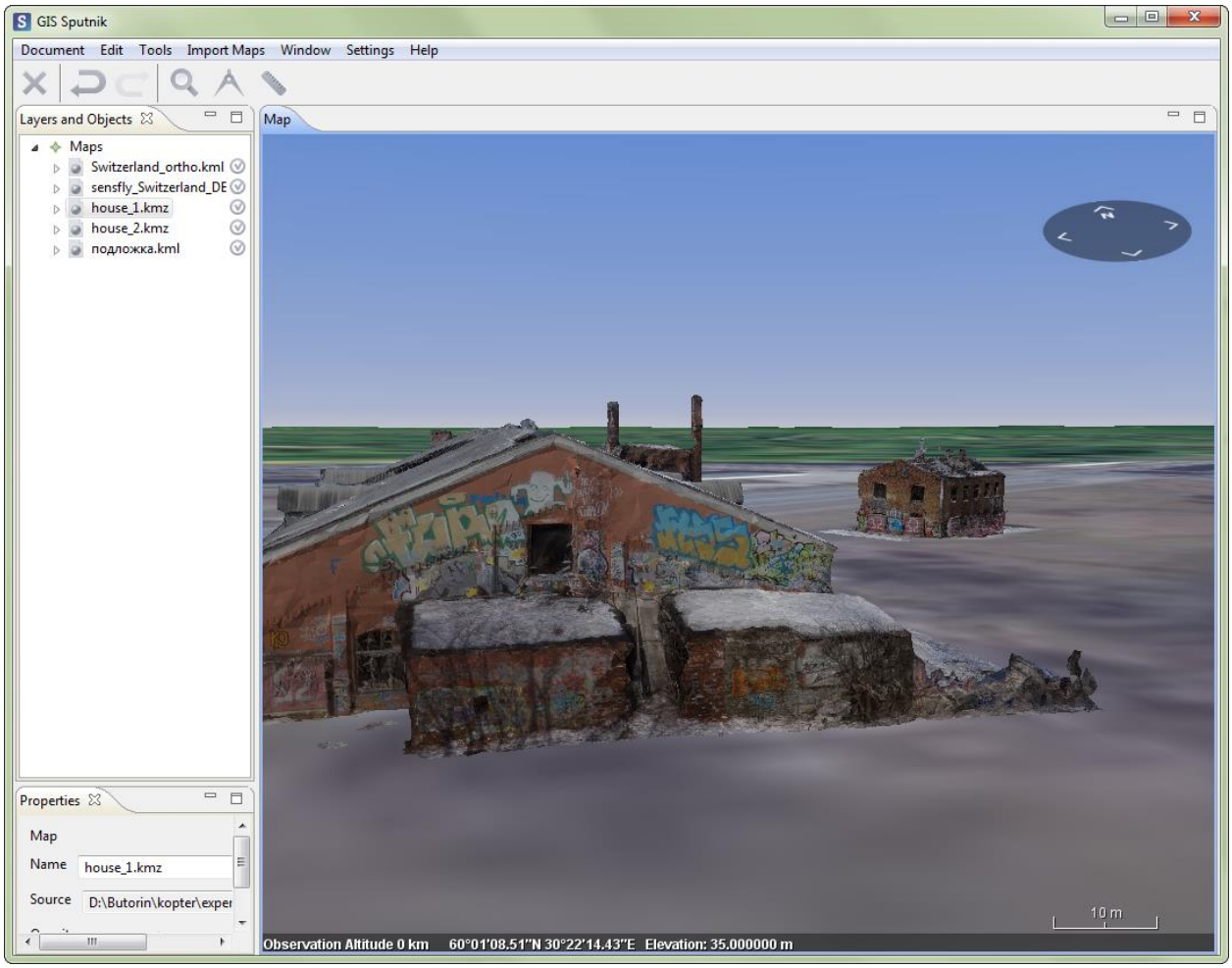
Workflow

3D models are loaded in the same way as maps and elevation models:

- Select **Import Maps** > **KML**, then choose file house_1.kmz from unpacked sample dataset.
- When model is loaded new layer appears in "Layers" pane.
- To display model double click on its name in layers list.

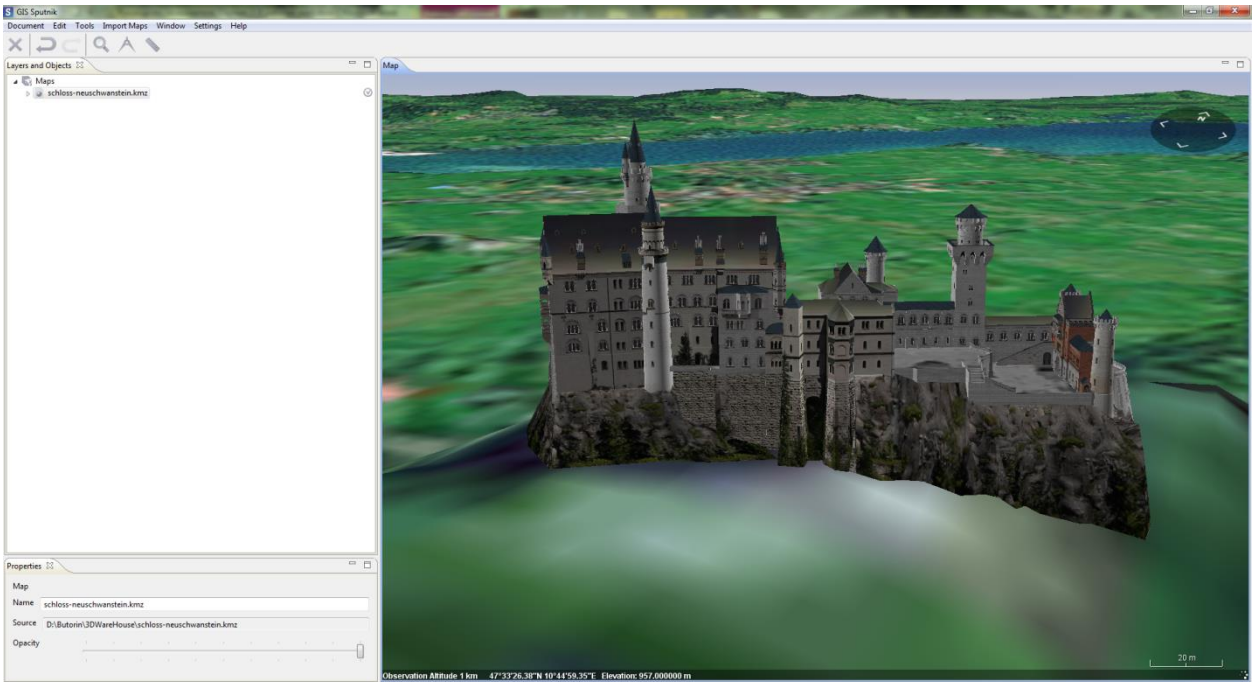
Use navigation options to change viewing angle and position.

Repeat procedure to load another file house_2.kmz. That will bring a neighboring building on a map.



It is also possible to load 3D designed models. Let's take, for example a model from 3dwarehouse (http://www.sketchup.com/products/3D-warehouse):

- go to http://sketchup.google.com/3dwarehouse/details?mid=be26635c5be9f21b9b9685fd76f6c85&prevstart=0.
- Select **Download Model** > **Google Earth 4 (.kmz)**.
- Save schloss-neuschwanstein.kmz file on your computer.
- Load it into Sputnik:



Connection to WMS servers

Overview

WMS is the most common protocol used to make maps available via intra- or internet. Number of free available maps including Open Street Map (OMS) and satellite imagery are distributed as WMS service.

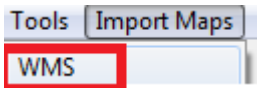
This tutorial describes how to connect to WMS servers.

First:

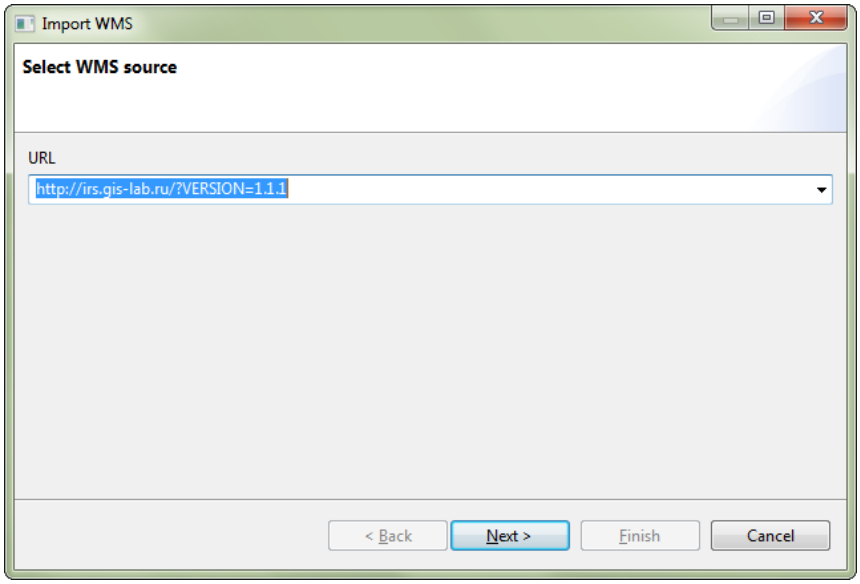
- Make sure you have broadband internet connection.
- Check that website http://irs.gis-lab.ru/?VERSION=1.1.1 is available.

Setting connection

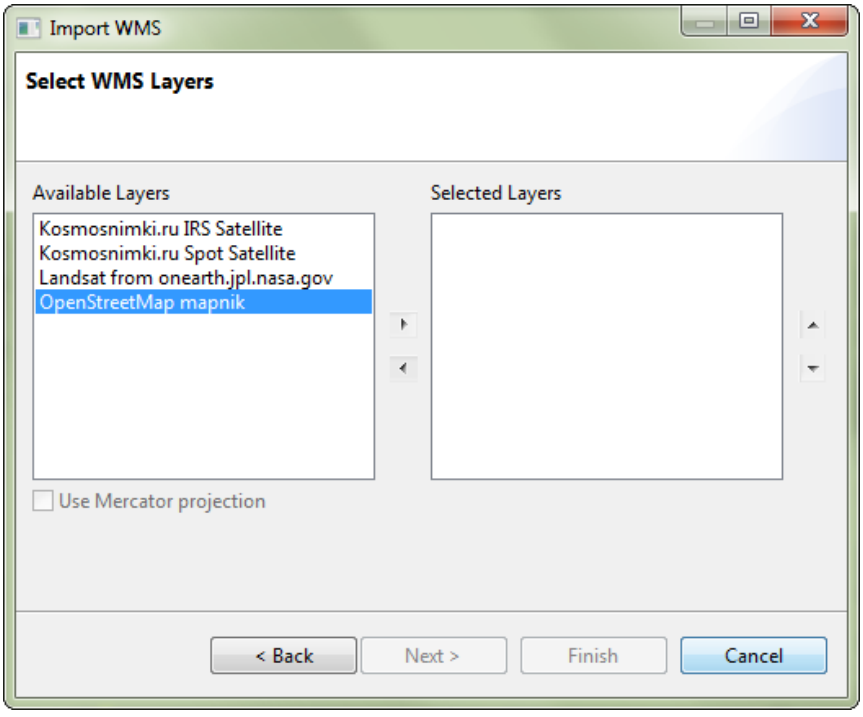
- Select **Import Maps** > **WMS** in user menu.



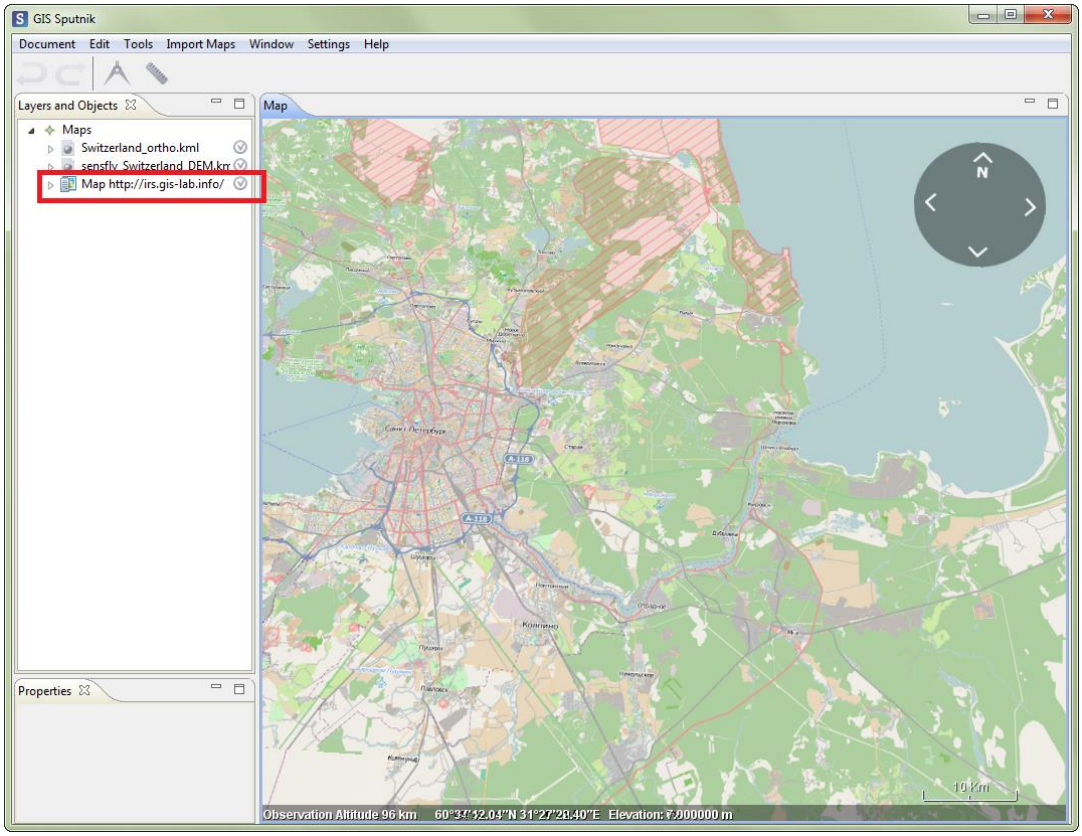
- Input address of known WMS server, for example http://irs.gis-lab.info/?VERSION=1.1.1:



- When list of layers provided by this server is loaded, select layers you want to have on a map (use arrow buttons or double click on layer name to move it to “Selected” list):

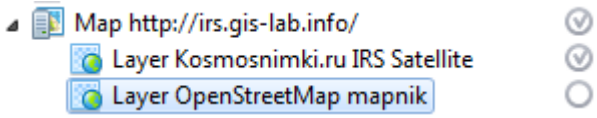


- Press **Finish** button.



As a result selected layer will be displayed on a map.

If several layers were selected they will form a group:



In a similar way data may be added from any OGC-compliant servers, including ArcGIS, Geoserver (www.geoserver.org) and others.

With any questions on Sputnik purchase and technical support please contact us via e-mail: sputnik@geoscan.aero.

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